

REMARKS

The application has been amended and is believed to be in condition for allowance.

This amendment is being filed as part of an RCE.

Applicant believes the case is condition for allowance. However, should there be any unresolved issues, a PERSONAL INTERVIEW is requested with the below attorney prior to any further Official Action.

Claims 1-23 are pending, claims 21-23 being newly added.

Claim 16 was objected to due to an informality. Claim 16 has been responsively amended. Applicant appreciates the Examiner identifying the informality.

Claims 1-20 stand rejected under §112, first paragraph, as failing to comply with the written description requirement. It is said that the claims contain subject matter not described in the specification so as to reasonably convey that the inventor had possession of the claimed invention at the time the application was filed.

First please see the attached drawing page, specifically, Figure 1 illustrating a relevant aspect of the invention. In Figure 1 there is shown a first horizontal period and a second horizontal period (labeled as "One horizontal period" and "Next horizontal period"). Also shown in Figure 1 is

a first horizontal line and a second horizontal line (labeled as "One horizontal line" and "Next horizontal line"). See also the identification of pixels within each horizontal line.

As illustrated, the present invention compares each picture data between two consecutive horizontal periods; that is, it compares picture data before one horizontal period with picture data to be next displayed. In this way, the present invention can effectively execute pre-charging.

The basis for the first paragraph rejection concerns the claim 1 and 8 amended recitations of "a picture data comparator for comparing, for each signal line, picture data between two consecutive horizontal periods by comparing said picture data before one horizontal period with said picture data to be next displayed in the one horizontal period;" (claim 1) and the new recitations in claim 15 of:

"a last data latch (11) for holding picture data from a last horizontal period before a current horizontal period,

"a comparator (12), connected to an output of the last data latch, for comparing the picture data from the last horizontal period with a picture data to be next displayed during the current horizontal period, for each signal line."

The Official Action correctly notes that the actual language in the specification, e.g., page 4, is (emphasis added):

"A signal line driving circuit according to the present invention is characterized in that it applies a pre-charging voltage and a gradation voltage corresponding to a picture data to a plurality of signal lines, and it has a picture data comparator for comparing a picture data before one horizontal period with a picture data to be next displayed for each signal line, and a switch controller for controlling a supply of the pre-charging voltage in accordance with a result compared by the picture data comparator. A signal line driving method according to the present invention is characterized in that it is used in a signal line driving circuit according to the present invention and it compares a picture data before one horizontal period with a picture data to be next displayed for each signal line and controlling a supply of the pre-charging voltage in accordance with that compared result."

The Official Action rejection rests on the term "consecutive" not appearing in the specification as filed. The Official Action states that "There is no mention of consecutive horizontal periods, and picture data before one horizontal period is not equivalent in meaning to picture data in the first of two consecutive horizontal periods. Further, picture data to be next

displayed also is not equivalent in meaning to picture data in the second of two consecutive horizontal periods."

Applicant respectfully disagrees.

Consider the context of the invention; that is, that the invention provides an improvement to the problems associated with the disclosed prior art of Figures 9-11.

Figure 9 shows pre-charging circuit 25 with switches SW11, SW21, ..., SWn1 for connecting signal lines S1, S2, ..., Sn to signal line driver 22; and switches SW12, SW22, ..., SWn2 for connecting the signal lines with a middle potential Vp. Vp is the precharge voltage whereas signal line driver 22 provides the gradation voltage.

The switches SWn1, SWn2 are respectively turned on and off in accordance with pulse signals SP1, SP2 sent from the external timing generator 21. See Figures 10-11.

Figure 11 illustrates that the conventional signal line driving circuit always carries out the pre-charging operation irrespectively of the gradation voltage sent before and after a horizontal period. See in Figure 11 that every horizontal period receives a pre-charging.

The specification discloses (page 3, first full paragraph) that, "if a gradation voltage of a picture data to be next displayed is equal to a gradation voltage of a picture data before the one horizontal period or it is within a certain range

of that gradation voltage, the execution of the pre-charging operation causes a voltage fluctuation in the signal line to be larger, which results in a problem that a consumptive electric power is conversely increased correspondingly to the voltage fluctuation." It is clear here that the specification is referring to the picture data of two consecutive horizontal periods within the same picture frame, i.e., G_i and G_{i+1} .

Next consider the recitations of claims 1 and 8. The focus under §112, first paragraph, is what the specification reasonably conveys to one skilled in the relevant art. The recitation of "comparing, ..., picture data between two consecutive horizontal periods by comparing said picture data before one horizontal period with said picture data to be next displayed in the one horizontal period;" is conveyed by and consistent with the specification disclosure of comparing a picture data "before one horizontal period" (i.e., a last horizontal period) with a picture data to be next displayed (i.e., a next horizontal period). A "before one horizontal period" and a "next displayed" clearly conveys two consecutive horizontal periods to one of skill in the art.

The Official Action, in the last sentence of page 2, further states that "Picture data to be next displayed could also be interpreted as picture data of the next frame."

The Official Action seems to be confusing 1) how a claim, during examination, should be interpreted with 2) what disclosure in the specification fairly conveys to one skilled in the art.

It is true that language in a claim may be broadly interpreted during examination. However, this is an issue apart from what the specification conveys to one skilled in the art. In amending the claims to avoid the recitation of "picture data to be next displayed" reading on "picture data of the next frame", applicant may use more specific language as long as that more specific language is supported by the originally filed application. The amended language as to "two consecutive horizontal periods" is supported by the originally filed application as that is what one skilled in the art would understand the disclosure to mean.

It is what the specification conveys to one skilled in the art that determines what applicant can claim. The amended recitations are consistent with the disclosure that would be conveyed to one skilled in the art. Applicant notes that the Official Action has not stated that the invention is different from the recited in the amended claim.

Next consider claim 15 which recites:

"a last data latch (11) for holding picture data from a last horizontal period before a current horizontal period,

"a comparator (12), connected to an output of the last data latch, for comparing the picture data from the last horizontal period with a picture data to be next displayed during the current horizontal period, for each signal line."

Reference is made to Figure 1 together with the corresponding disclosure of specification page 7 (emphasis added).

"A signal line driving circuit in this embodiment is used in an active matrix type of a liquid crystal display. It supplies a middle potential Vp serving as a pre-charging voltage and a gradation voltage corresponding to a picture data to a plurality of signal lines. It is characterized in that it is provided with: a latch 11 and a comparator 12 serving as a picture data comparator for comparing a picture data before one horizontal period with a picture data to be next displayed for each signal line; and a switch controller 13 serving as a switch controlling unit for supplying the middle potential Vp in accordance with the compared result by the comparator 12."

Consider this disclosure in combination with the following from specification page 8 (emphasis added).

"The latch 11 is connected to an output side of the data latch 33. Immediately before a data stored in the

data latch 33 is updated by a signal LP, it captures a data outputted by the data latch 33 in accordance with a signal LC. Thus, the latch 11 can store the picture data displayed before the one horizontal period. Hence, the comparator 12 can compare the picture data before and after the one horizontal period with each other, on the basis of the output signal from the data latch 33 and the output signal from the latch 11."

The specification disclosure, taken together with the circuits illustrated in the drawing figures clearly shows comparing picture data from two consecutive horizontal periods of the same picture frame.

From these disclosures, it is believed that the application as filed reasonably conveys to one skilled in the art that applicant had possession of the claimed invention.

In view of the above, the rejection under §112, first paragraph, is not believed to be viable. Reconsideration and withdrawal of this rejection are therefore respectfully requested.

Substantive Rejections

Claims 15-20 are not substantively rejected.

As claims 15-20 have not been substantively rejected, their allowance is solicited.

Claim 2 has been amended. In the Official Action of February 3, 2004, on page 5, lines 1-2, there was reference to USUI "the selector consequently outputs a maximum or minimum gray scale value, which is a pre-charge voltage." However, as amended, claim 2 avoids this disclosure by making clear that the pre-charging voltage is independent of the gradation voltage.

Claims 1-3, 5-10, and 12-14 stand rejected as obvious over NITTA et al. 6,661,402 in view of USUI et al. 5,844,533.

Claims 4 and 11 stand rejected as obvious over NITTA et al. and USUI et al. in further view of LIAW et al. 6,483,494.

As to claims 1 and 8, the Official Action points out that the combination of NITTA et al. and USUI et al. would comparing the picture data from one frame with the picture data from another screen. The Official Action relies on USUI et al. column 2, lines 4-15, "The liquid crystal display apparatus compares display data for the current screen with that for the immediately previous screen."

Again, please see the attached drawing page illustrating an aspect of the present invention and the teaching of USUI et al.

As illustrated, the present invention compares each picture data between two consecutive horizontal periods; that is, it compares picture data before one horizontal period with

picture data to be next displayed. In this way, the present invention can effectively execute pre-charging.

The present invention is contrasted to USUI wherein, as illustrated, the comparison is between data of two frames. See USUI Figure 8 showing a frame memory 73, 74 and a ROM 77 (a comparator) which compares data stored in the frame memory on a frame-to-frame basis.

The Official Action correctly points out that the first horizontal line of the current screen and the last horizontal line of the immediately previous screen are two consecutive horizontal periods.

The two above points, however, do not result in the recitation of "comparing, ..., picture data between two consecutive horizontal periods by comparing said picture data before one horizontal period with said picture data to be next displayed in the one horizontal period". The USUI et al. disclosure teaches to do a comparison on a frame unit basis whereas the claim recites a comparison on a scan line unit basis (comparing picture data of two consecutive horizontal periods equals comparing picture data of two consecutive scan lines of the same frame).

The obviousness rejection thus fails as the proposed combination would not compare picture data between two consecutive horizontal periods. Specifically, there is no comparison of the picture data from the first horizontal line of

a current screen (frame) with the last horizontal line of the immediately previous screen (frame).

With the exception of the above, the rejection relies on the arguments raised by the Official Action of February 3, 2004.

As previously pointed out and discussed above, the present invention concerns data being currently output, one horizontal scan line at a time, on scan lines G1, G2, through Gn of Figure 9 of a single frame. This data is being output through the plural signal lines S1, S2 through Sn, where, for any one signal line Si, the data is output one scan line at a time. For signal line Si, data is output to G1, then data is output to G2, then data is output to G3 during consecutive horizontal time periods.

In Figure 9, there is shown pre-charging circuit 25 switched, in sequential turn, to scan lines G1, G2, ..., through Gn. Figure 10 details the signal line driving circuit 22 Figure 9.

The switches SWn1, SWn2 are respectively turned on and off in accordance with pulse signals SP1, SP2 sent from the external timing generator 21 as per Figure 11. As can be understood from periods T1, T2 of Figure 11, this conventional signal line driving circuit always carries out the pre-charging

operation irrespectively of the gradation voltage sent before and after any given horizontal period.

In contrast, the inventive signal line driving circuit applies a pre-charging voltage and a gradation voltage using a picture data comparator for comparing a picture data before one horizontal period with a picture data to be next displayed for each signal line. That is, for signal line S_i , the picture data comparator compares a picture data already output for G_1 with a picture data to be output for G_2 . Similarly, in the next horizontal time period, a picture data output for G_2 with a picture data to be next output for G_3 , In accordance with each comparison result, a switch controller controls a supply of the pre-charging voltage. Thus, the comparison between the picture data of two consecutive horizontal lines (two consecutive horizontal periods) controls the pre-charging voltage of each S_i signal line.

This approach is conceptually and structurally different from the applied art.

As acknowledged, by the Official Action, NITTA et al. do not include the recited comparator which compares data to be next displayed with data displayed one scan line period before, i.e., data displayed on the last scan line associated with the particular display line S_i . Note, both the "data to be next

displayed" and the "data before one horizontal period" are of the same frame image.

USUI et al. is offered as disclosing "display data for the current screen with that for the immediately previous screen." That is, USUI et al. compare data for the next to be displayed frame with data of the last frame.

This is not the method or structure of the present invention. Thus, even if the references are combined, they do not result in the present invention.

The Dependent Claims

The Official Action does not address the dependent claims in light of the amendment concerning the "two consecutive horizontal periods". This recitation makes clear that the features of the dependent claims are both novel and non-obvious.

Reconsideration and allowance of all the pending claims is respectfully requested.

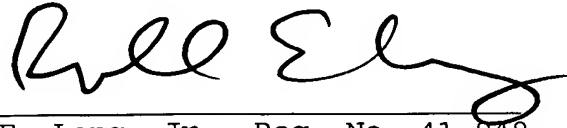
In view of the above, applicant believes that the present application is in condition for allowance and an early indication of the same is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any

overpayment to Deposit Account No. 25-0120 for any additional
fees required under 37 C.F.R. §1.16 or under 37 C.F.R. §1.17.

Respectfully submitted,

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APPENDIX:

The Appendix includes the following item:

- a drawing page illustrating an aspect of the present invention and the teaching of USUI et al.